WE CLAIM:

1. A Q-switched laser, comprising:

a polarization-dependent resonant cavity including a fiber chain having a gain medium between narrowband and broadband fiber gratings;

a pump source that couples energy into the fiber chain to pump the gain medium; and

a modulator that applies stress to the fiber chain to induce birefringence and switch the cavity Q-factor to alternately store energy in the gain medium and then release the energy in a laser pulse.

2. The Q-switched laser of claim 1, wherein at least a portion of the fiber chain comprises a polarization-dependent fiber.

3. The Q-switched laser of claim 1, wherein the narrowband fiber grating is formed in a polarization maintaining (PM) fiber creating a pair of reflection bands that correspond to different polarization modes, said broadband grating having a reflection band that is aligned to one of the narrowband grating's reflection bands.

4. The Q-switched laser of claim 1, wherein the modulator comprises a piezoelectric transducer (PZT).

5. The Q-switched laser of claim 1, wherein the PZT is driven at less than 50 V.

6. The Q-switched laser of claim 1, wherein the retardance

of the birefringence is approximately one-quarter wave of the laser pulse.

7. The Q-switched laser of claim 1, wherein the gain medium is formed in an oxide-based multi-component glass fiber and the gratings are formed in passive silica fiber fused at either end of the multi-component glass fiber.

8. The Q-switched laser of claim 1, wherein the length of the resonator is less than 5 cm and the laser pulse is single-frequency.

9. The Q-switched laser of claim 1, wherein full-width half-maximum of the laser pulse is less than 100 ns.

10. The Q-switched laser of claim 9, wherein the repetition rate of the laser pulse is at least 1 kHz.

11. The Q-switched laser of claim 9, wherein the peak power of the laser pulse is at least 1 W.

12. A Q-switched laser, comprising:

a polarization-dependent resonant cavity comprising,

a gain fiber,

a narrowband grating formed in a polarization maintaining (PM) fiber spliced to one end of the gain fiber, said narrowband grating in said PM fiber having two reflection bands that correspond to different polarization modes,

a broadband grating formed in a fiber spliced to the other end of the gain fiber, said broadband grating having a reflection band that is aligned to one of the

narrowband grating's reflection bands;

a pump source that couples energy into the resonant cavity to pump the gain fiber; and

a modulator that applies stress to the fiber chain to induce birefringence and switch the cavity Q-factor to alternately store energy in the gain medium and then release the energy in a laser pulse.

13. The Q-switched laser of claim 12, wherein the modulator comprises a piezoelectric transducer (PZT).

14. The Q-switched laser of claim 12, wherein the retardance of the birefringence is approximately one-quarter wave of the laser pulse.

15. The Q-switched laser of claim 12, wherein the gain fiber is formed of an oxide-based multi-component glass and the gratings are formed in passive silica fiber fused at either end of the multi-component glass fiber.

16. A Q-switched laser, comprising:

a polarization-dependent resonant cavity comprising,

a gain fiber formed of an oxide-based multi-component glass,

a narrowband grating formed in a passive silica polarization maintaining (PM) fiber spliced to one end of the gain fiber, said narrowband grating in said PM fiber having two reflection bands that correspond to different polarization modes,

a broadband grating formed in a passive silica fiber spliced to the other end of the gain fiber, said broadband grating having a reflection band that is aligned

to one of the narrowband grating's reflection bands;

a pump source that couples energy into the resonant cavity to pump the gain fiber; and

a piezoelectric transducer (PZT) that applies stress to at least one of the silica fibers to induce birefringence and switch the cavity Q-factor to alternately store energy in the gain medium and then release the energy in a laser pulse.

17. The Q-switched laser of claim 16, wherein full-width half-maximum of the laser pulse is less than 100 ns.

18. The Q-switched laser of claim 16, wherein the repetition rate of the laser pulse is at least 1 kHz.

19. The Q-switched laser of claim 16, wherein the peak power of the laser pulse is at least 1 W.

20. A Q-switched laser, comprising:

a resonant cavity including a narrowband reflector having a polarization-dependent reflection band centered at a laser wavelength, a gain medium and a broadband reflector having a reflection band that overlaps the polarization-dependent reflection band so that the cavity has a high Q-factor at the laser wavelength and polarization;

a pump source that couples energy into the resonant to pump the gain medium; and

a modulator that affects the polarization of light oscillating in the resonant cavity to reduce the Q-factor to store energy in the gain medium and then return the Q-factor to its high value to release the energy in a laser pulse.

21. The Q-switched laser of claim 20, wherein the reflectors and gain medium are formed in a fiber chain, said modulator applying stress to the fiber chain to alter its birefringence and change the polarization of the light.

22. The Q-switched laser of claim 1, wherein the narrowband fiber grating is formed in a polarization maintaining (PM) fiber creating a pair of reflection bands that correspond to different polarization modes, said broadband grating having a reflection band that is aligned to one of the narrowband grating's reflection bands.